

# ANISACANTHUS QUADRIFIDUS SENSU LATO (ACANTHACEAE)

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Studies of a third linear-leaved taxon of *Anisacanthus* from the Chihuahuan Desert Region [see Henrickson and Lott, 1982 for discussion of *Anisacanthus linearis* (Hagen) Henrickson and Lott, and Daniel and Henrickson, 1982 for discussion of *A. junceus* (Torr.) Hemsl.] have led to a re-evaluation of two wide-spread species: *A. wrightii* (Torr.) Gray and *A. quadrifidus* (Vahl) Nees. *Anisacanthus wrightii* and *A. quadrifidus* were distinguished by Hagen in his 1941 monograph of the North American species of the genus on the basis of calyx size and calyx lobing. *Anisacanthus quadrifidus*, which ranges from San Luis Potosi south to Hidalgo, Puebla and Oaxaca, has calyces 7–10 mm long with attenuate lobes 5–6 mm long while *A. wrightii* of Texas, Coahuila, Nuevo Leon, Tamaulipas has shorter calyces under 5 mm in length with acute lobes 1–3 mm long. In his monograph, Hagen named a new variety of *A. wrightii* from near Saltillo, Coahuila with narrow leaves and very short calyx lobes as *A. w.* var. *brevilobus* Hagen.

A similar, and even more distinct taxon with shorter calyces and even narrower leaves is here separated from Hagen's *A. quadrifidus*. The new taxon, from the states of San Luis Potosi and Zacatecas, was hidden within Hagen's *A. quadrifidus*. A total of six specimens referable to the taxon were cited by Hagen (1941) in his specimens examined, but their measurements were neither included in the species description nor in the key, and until his cited specimens were seen, recent collections of the taxon were considered novelties. The taxon is here referred to by its manuscript name "*potosinus*."

Hagen (1941) considered vestiture, corolla size and particularly calyx characters as important features in distinguishing taxa of *Anisacanthus*. While *A. quadrifidus* and *A. wrightii* differ in some quantitative leaf and calyx features, they are similar in a large number of both qualitative and quantitative features including growth habit, stem and leaf vestiture, leaf texture, inflorescence and bract size, orientation, and structure, calyx vestiture and corolla size, structure and orientation etc. (see descriptions

below). In contrast, other North American species in the genus have some complex of character states that set them apart from these and other species (see Hagen 1941).

In addition to the calyx characters indicated by Hagen, *A. quadrifidus* and *A. wrightii* also differ in leaf size and petiole length. *Anisacanthus wrightii* tends to have broader leaves [(7-)11–20 mm wide] and longer petioles [(2.5-)5–10 mm long] than *A. quadrifidus* which typically has mature leaves only 3–11 mm wide and petioles only 1–4 mm long.

The quantitative differences between these taxa are illustrated by means of bivariate plots in Fig. 1a, b, and by line drawings in Fig. 2. Figure 1a is a simple bivariate plot showing petiole length (in mm) as y-axis and maximum leaf width (in mm) as x-axis for each of the four recognized taxa and an intermediate population. Leaf width-petiole length measurements were taken from 1 leaf per herbarium specimen (from 1 per collection when duplicates were present) from "typical" large leaves. While it is recognized that this neither represents a statistical sample nor necessarily represents the largest leaves present on the plant, it does reflect the characters available to a taxonomist working with herbarium material.

Figure 1b is a similar bivariate plot for calyx features with the y-axis showing calyx-tube length, the x-axis showing calyx-lobe length for the same specimens and taxa. Calyx measurements were taken from flowers at or near anthesis as calyx tubes are slightly accrescent. There always is some variation among these measurements on any specimen and the data presented here are intended to show only the trends in variation.

Data in Fig. 1a, depicting leaf width vs. petiole length, show a continuous range of variation from the broad-leaved, long-petioled *A. wrightii* to the progressively narrower-leaved, shorter-petioled *A. quadrifidus*, and taxa *brevilobus* and "*potosinus*" with some overlap between each taxon. Figure 1b, showing calyx tube vs. calyx lobe lengths, illustrates a similar pattern. However, in these characters, *A. quadrifidus* has the longest calyx lobes, 2 to 4 times longer than the calyx tubes, and *A. wrightii* and taxon "*potosinus*" both have shorter calyx lobes, 1 to 2 times longer than the tubes. Calyx lobes of taxon *brevilobus*, in contrast, are as long as or shorter than their calyx tubes (Fig. 1b).

When both data sets are considered, one sees that each taxon has its own unique quantitative characters. *Anisacanthus wrightii* has broader leaves and longer petioles; *A. quadrifidus* has the longest sepal lobes, relatively short petioles; taxon *brevilobus* has moderately narrow leaves, and very short calyx lobes; while taxon "*potosinus*" has very narrow leaves, small calyces but with moderately long lobes. These characters, however, are not discrete from those of the other taxa. Rather the character states are contiguous or

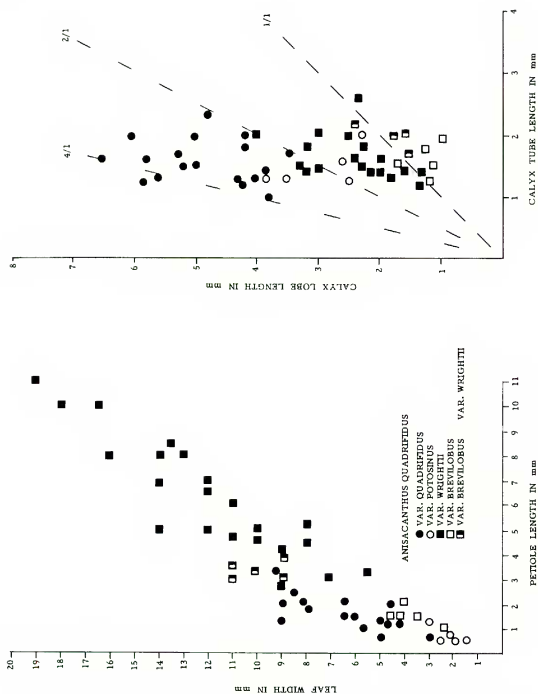


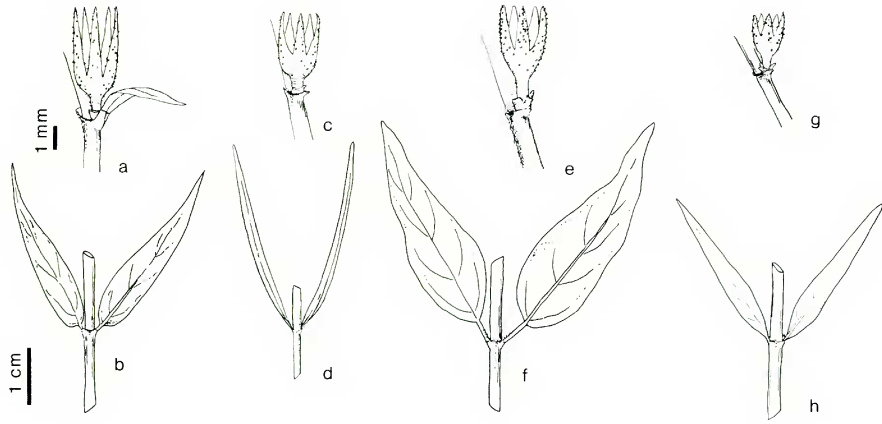
Fig. 1. Bivariate plots of leaf and calyx characters of *Anisacanthus quadrifidus*. a. — Standard plot of petiole length (in mm) vs. maximum leaf width (in mm). Data obtained from largest leaf present in herbarium specimens of collections available for study. Designation of infraspecific taxa are indicated as shown. Plants near Galeana, Nuevo Leon with leaves as in *A. q. var. wrightii* but calyces as in *A. q. var. brevilobus* are indicated as intermediate between these taxa. b. — Standard plot of calyx tube length vs. calyx lobe length in mm of calyces of flowers at or very near anthesis. Dashed lines indicate ratios of lobe vs. tube lengths where lobes are equal to tube length (1/1), two times tube length (2/1), and four times tube length (4/1).

slightly overlapping with those of related taxa (Fig. 1a, b). The fact that these four taxa share a large number of vegetative and floral characteristics and that other North American taxa in the genus differ to some degree from these taxa in various quantitative or qualitative characteristics supports the contention, presented here, that the four taxa are best ranked at the infraspecific level rather than as distinct species.

Each taxon also has its own geographical range. *Anisacanthus quadrifidus* is known from arid deciduous scrub in southern Mexico from Oaxaca, Puebla north to the states of Mexico, Hidalgo and Queretaro from 1000–2400 m elevation (Fig. 3). In contrast, *A. wrightii* occurs in the Tamaulipan scrub from southern Texas through Coahuila, Nuevo Leon south into Tamaulipas mostly from 320–900 m elevation. Although these two allopatric taxa are sometimes quantitatively similar, identification of herbarium specimens is never a problem as the taxa easily can be distinguished geographically. Hagen's *A. wrightii* var. *brevilobus* occurs locally in canyons and drainages east of Saltillo, Coahuila in the transition between semi-arid plains and chaparral scrub vegetation on the slopes from 1500–1800 m elevation (Fig. 3). There are populations combining the characters of *A. wrightii* and taxon *brevilobus* in the Sierra Madre Oriental about 110 km southeast of this area near Galeana and Pablillo, Nuevo Leon that have the short calyx lobes of taxon *brevilobus* and the long-petioled, broader leaves typical of *A. wrightii*. They also occur at an elevation more characteristic of taxon *brevilobus*—1700–2000 m. These intermediate plants are designated in Figs. 1, 3 by intermediate (half-darkened) symbols. Not all collections from this area have short calyx lobes however. The origin of the short calyx lobes may be related to past introgression between *A. wrightii* and the taxon *brevilobus*.

The connecting link between *A. quadrifidus* and *A. wrightii* is provided by the narrow-leaved taxon "*potosinus*" which occurs along the southern border of the Chihuahuan Desert Region and in more montane areas within the southern portion of the Chihuahuan Desert proper from San Luis Potosi to northern Zacatecas (Fig. 3). The taxon occurs in an arid scrub mostly from 1800–2100 m elevation. With its very narrow, linear-lanceolate leaves and relatively short calyces, it appears very much like a more xeric-adapted derivative of *A. quadrifidus*. While taxon "*potosinus*" is disjunct from *A. quadrifidus* in the south, its northern range shows a geographical link with *A. wrightii*.

The question arises whether the short calyx-lobe character of *A. wrightii* var. *brevilobus* could have arisen from past introgression with northern populations of short-calyced "*potosinus*." As noted above, populations of "*potosinus*" currently occur at relatively high elevations along the southern



border of, and in scattered montane islands within the southern Chihuahuan Desert. It is probable that during the Holocene "*potosinus*" was more widespread and may have come into contact with other taxa of *Anisacanthus*.

Daniel (1982) reports that while natural hybrids are not known in *Anisacanthus*, he has successfully made artificial crosses between *A. wrightii* and the longer-flowered *A. linearis* and *A. thurberi*. The progeny of these crosses exhibited pollen stainability of 99 and 91 percent respectively. If one finds such high cytological compatibility between these diverse species, may we expect the same from the four taxa dealt with in this paper?

The striking vegetative similarity between "*potosinus*" and the linear-leaved *A. linearis* (Henrickson and Lott 1982) and *A. junceus* (Daniel and Henrickson 1982) of the northern Chihuahuan Desert is very apparent. Vegetatively these three taxa are difficult to distinguish, however, *A. linearis* and *A. junceus* belong to a separate lineage within the genus that has much longer corollas (40–56 mm long) with longer lobes and filaments (18–35 mm long) than those of the *A. quadrifidus-wrightii* taxa whose corollas and filaments measure 30–38 mm (rarely to 45) and 9–11 mm respectively. They also differ in a number of other characteristics involving vestiture, pedicels, calyx structure etc., characters that are not in evidence in "*potosinus*." Whether the linear-leaved characteristics of these taxa and our "*potosinus*" is due to convergent adaptation to xeric habitats or is due to past introgression with these taxa is unknown. But the lack of *A. linearis* and *A. junceus* characteristics in "*potosinus*" suggests the independent development of linear leaves by "*potosinus*."

As noted above, the occurrence of "*potosinus*" in the Chihuahuan Desert was unknown to me until recently. A collection from northern Zacatecas (Henrickson 6222) was confused with *A. junceus* and illustrated as *A. junceus* by Henrickson in Daniel and Henrickson (1982, Fig. 1c). As noted in the paper it differed from true *A. junceus* in its more distinctly glandular calyx.

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Fig. 2. Line drawings of calyces and leaves of varieties of *Anisacanthus quadrifidus*. a-b. — *A. q.* var. *quadrifidus*. a. — Calyx showing persisting bract. Note position of line of abscission above persisting bract base and long calyx lobes. b. — Leaves. Note relatively short petiole. Both Lott & Wendt P35 (TEX). c-d. — *A. q.* var. *potosinus*. c. — Calyx showing moderate long lobes. d. — Leaves are consistently narrow in this variety. Both Wendt *et al.* 2235 (TEX). e-f. — *A. q.* var. *wrightii*. e. — Calyx with moderate long lobes. Note decurrent lines of decurved hairs. f. — Leaves. Note large size, long petioles. Both Smith 229 (TEX). g-h. — *A. q.* var. *brevilobus*. g. — Calyx showing characteristic short lobes. h. — Leaves which tend to be narrow. Both Waterfall & Wallis 13246 (F). All calyces and leaves drawn to scale. Magnification indicated in a and b. Drawing by K. Cook.

While some questions remain as to the role of past introgression in northern Mexican *Anisacanthus*, the data presented here indicates that *A. quadrifidus* and *A. wrightii*: (1) share a large number of characteristics; (2) as a unit they are well distinguished by these characteristics from other species in the genus (see Hagen 1941); (3) their distinguishing characteristics tend to grade into those of other taxa (Figs. 1, 2); (4) while each taxon has its own geographical range, there is some indication of introgression in the short calyx-lobed populations of *A. wrightii* near Galeana in Nuevo Leon. To reflect this pattern, the taxa in *Anisacanthus quadrifidus* and *A. wrightii* are here combined into a single species which takes the name of the oldest specific epithet and the type of the genus *Anisacanthus quadrifidus* (Vahl) Nees and the other taxa are reduced to varieties of this species.

#### ANISACANTHUS QUADRIFIDUS (Vahl) Nees

Moderately to strongly branched, erect to spreading shrubs 0.5 – 1.5 (-2.6) m tall; young stems with internodes (5-)10 – 45(-65) mm long, 0.7 – 1.5 mm wide, terete, non to weakly striate, yellow-green, with decurved to more or less straight hairs 0.1 – 0.4 (-0.6) mm long in 2 broad decurrent lines extending from leaf-petiole margins across a stipular ridge and down the complete internode, this well developed or sparse, otherwise glabrous or sometimes sparsely hirtellous, rarely sparsely glandular but soon to tardily glabrate; older stems tan to grayish, with bark not peeling in sheets. Leaves opposite, lanceolate, linear-lanceolate to linear, (8-)15 – 35(-65) mm long, (0.8)1.0 – 16(-20)[-30] mm wide, (reduced above), tapering to an acute tip, rounded to cuneate, sometimes oblique, subsessile or with petioles (0.5-)1 – 7(-10) mm long at base, unevenly entire at yellowish, sometimes revolute (when dry) margins, glabrous to glabrate on both surfaces except for few to many antrorsely curved hairs along lower impressed midrib above and along lower leaf and petiole margins; leaf-blades yellow-green, more or less glandular-punctate, with midvein raised, yellowish beneath; leaves abscising at base above a yellowish, broad, persisting leaf-base 0.3 – 0.5 mm high, 0.8 – 1.6 mm wide, with abscission line often appearing black. Flowers 1 (-3) at upper nodes borne on elongate, slender, secund, upwardly arching, spicate racemes along terminal (2-)5 – 14 cm of seasons shoots; inflorescence internodes 2 – 14(-18) mm long, vestitured as stems or more hirtellous; bracts (reduced leaves) lanceolate-deltate, 2 – 7 mm long to 0.5 – 1.3 mm wide at base, acute to attenuate; paired bracteoles similar, 2 – 3 mm long, both rather soon caducous leaving distinct protruding bract-bases topped with conspicuous tan, corky-rimmed abscission scars; peduncles broad, (0.5-)1 – 2(-3) mm long; calyces (3-)4 – 8(-10) mm long, tube 0.9 – 2.5(-3)

mm long, lobes lanceolate, oblong-lanceolate to deltate, (1.2-)2-6.5 mm long, 0.9-1.2 mm wide at base, lobes 0.8-4.8 times as long as tube at anthesis; pedicels, calyces hirtellous with erect hairs more or less 0.03 mm long particularly at tube base, and with more or less conspicuous yellow-headed, stipitate glands 0.05-0.1 mm long with heads 0.03-0.07 mm wide outside, margins and tips of lobes weakly pilose with hairs 0.1-0.2 mm long, these often tufted at tip, inner lobe surfaces weakly to densely sessile glandular and weakly strigose with scattered antrorse hairs near tube; corollas red to orange-red, often yellowish where shaded in bud, (29-)32-38(-45) mm long, tube expanded at base around ovary, slightly ampliate distally, 19-25(-28) mm long, upper (posterior) lobe 14-17 mm long, separating 3-7 mm proximal to lower 3-lobes, lower 3 lobes 9-13 mm long, all lobes flaring, oblong to strap-shaped, 2-3 mm wide, acute; corollas pilose-pubescent externally with multicellular, tapering, retrorsely bent-spreading hairs 0.2-0.3 mm long; stamens 2, inserted in lower lobe distal to separation of upper lobe; filaments glabrous (7-)9-11 mm long, orange-yellow, glabrous, straight; anthers (2.3-)2.7-3.4 (-3.7) mm long, thecae subequal to equal, parallel, separate for 1-1.5 mm at base, sporangia reddish, connective dull yellowish; style 26-35 mm long, glabrous, exserted; stigmatic lobes ca 0.2 mm long, acute. Capsules 13-16 mm long, glabrous, tan, basal flattened stipe 5-8 mm long, head ovoid, 6-8 mm long, apiculate, retinacula 2.5-3 mm long; seeds (2-)3-4, notched basally, 4.5-5.6 mm long, 4-4.5 mm wide, to 1 mm thick, at maturity brown, more or less bullate and tuberculate on both faces, or mainly on inner face, with thickened margins.

Four varieties are separable by the following key:

- A. Calyx lobes (1-)1.5-4.3 times as long as calyx tubes at anthesis; leaf-blades linear to lanceolate.
- B. Petioles of larger leaves 0.5-3(-4) mm long; larger leaf-blades linear-lanceolate, to 1-9(-13) mm wide.
- C. Leaf-blades lanceolate, to (3-)4.5-9(-13) mm wide; petioles (1-)2-3(-4) mm long; calyx lobes (1.6-)3-4.3 times as long as calyx tubes at anthesis; Hidalgo, Queretaro, south to Oaxaca  
..... *A. q. var. quadrifidus*
- CC. Leaf-blades linear-lanceolate, to (0.9-)1.5-3(-5) mm wide; petioles 0.5-1.2 mm long; calyx lobes (1.1-)1.5-2(-3) times longer than calyx tubes at anthesis; San Luis Potosi to northern Zacatecas  
..... *A. q. var. potosinus*
- BB. Petioles of larger leaves (3.5-)4-7(-11) mm long; larger leaf-blades lanceolate to lance-ovate, 7-15(-20) mm wide; calyx lobes 1-2.3 times as long as calyx tubes at anthesis; Texas, Coahuila, Nuevo Leon to Tamaulipas  
..... *A. q. var. wrightii*



- AA. Calyx lobes 0.5–0.8(-1.2) times as long as calyx tubes at anthesis; leaf-blades lanceolate to linear-lanceolate, 2.3–4.5 (-5.5) mm wide; Coahuila (southeast of Saltillo, and with intermediates with *A. q. var. wrightii* near Galeana, Nuevo Leon) . . . . . *A. q. var. brevifolius*

1. **ANISACANTHUS QUADRIFIDUS** (Vahl) Nees var. **QUADRIFIDUS**, Linnæa 16:307. 1842. *Justicia quadrifida* Vahl, Enum. Pl. 1:124. 1804, based on *Justicia coccinea* Cav. Icon. Pl. 2:77, pl. 199. 1793, non Aublet 1775. *Anisacanthus quadrifidus* (Vahl) Standley, Contr. U.S. Nat. Herb. 23:1343. 1926. TYPE: Nuevo Hispanica. LECTOTYPE here designated: MA (photo!); ISOLECTOTYPE: F!

*Anisacanthus virgularis* (Salisb.) Nees in DC. Prod. 11:445. 1847. *Justicia virgularis* Salisb., Parad. London. pl. 50. 1806. TYPE: HOLOTYPE: plate 50 in Parad. London. (see Hagen 1941, p. 405, a.). Correspondence with K and BM indicate no specimens referable to this collection exist. It was probably described and illustrated from garden material.

*Justicia superba* Hort. ex Nees in DC. Prod. 11:445. 1847. TYPE: (in herb. Hort. Berol. fide Nees).

*Justicia byssopifolia* Gouan ex Nees in DC. Prod. 11:445. 1847, non L. 1753, pro syn. (in herb. Hooker fide Nees).

*Siphonoglossa glabrescens* Lindau. Bull. Herb. Boiss. 2:546. 1894. TYPE: MEXICO. OAXACA. Distr. Tlacolula, prope Zoquitlan, Jun 1888, Seler 76 (HOLOTYPE: B, destroyed; PHOTOTYPES: GH, MICH, NY fide Hilsenbeck, pers. comm.).

Plants strongly branched; stems and inflorescence with decurrent lines of erect to decurved hairs (0.03-)0.1–0.2(-0.4) mm long, otherwise glabrous; petioles (1-)2–3(-4) mm long; leaves lanceolate, (1.4-)2.0–4.0(-5.0) cm long, (3.0-)4.5–9.0(-13.0) mm wide, margins more or less revolute when dry; calyces at anthesis (3.4-)4–7(-8) mm long, lobes (3.5-)4–5.5(-6.5) mm long, tube 1.5–2 mm long, lobes (1.6-)3–4.3 times as long as tubes, sparsely to densely hirtellous and with stipitate glands 0.06–0.12 mm long, their glands 0.04–0.06 mm wide outside, lobes densely glandular inside; corollas 33–40 mm long; anthers 2.7–3.4 mm long. Central Oaxaca to Puebla, Mexico, Hidalgo, Queretaro; 1000–2400 m elevation (Figs. 2a-b, 3).

*Anisacanthus quadrifidus* var. *quadrifidus* is readily recognizable by its long, lanceolate sepal lobes and relatively narrow leaves with short petioles. In describing *Justicia quadrifida*, Vahl (1804, page 124) cites Cavanille's (1793) *Justicia coccinea* as a synonym and appears to make a superfluous name for the taxon in a manner contrary to ICBN Article 63. However, on page 120, Vahl recognizes Aublet's (1775) *Justicia coccinea* as a species indicating that he considered the Cavanille name to be a later tautonym.

Representative specimens: MEXICO. OAXACA: 1.4 mi E of Tlacolula, 1670 m, 13 Nov 1980, Fryxell and Lott 3415 (TEX); road to Yagul, between Oaxaca and Mitla, 1 Mar 1960,

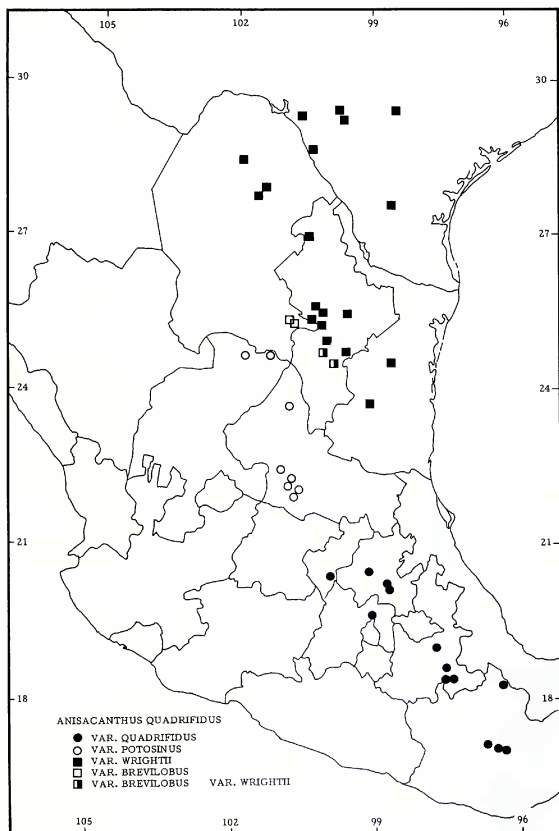


Fig. 3. Distribution of varieties of *Anisacanthus quadrifidus* in Mexico and Texas.

*Carlson 3698* (F - 2 sheets); Oaxaca Valley, 5000 ft, 7 Nov 1894, *Smith 713* (F). PUEBLA: San Bartolo, 15 km al NW de Tehuacan, 1700 m, 9 Jan 1959, *Rzedowski 9501* (TEX); 7.7 km al N de Tehuacan, 1900 m, 13 Sep 1980, *Lott and Wendt P35* (TEX). MEXICO: Cerro de Santa Cruz, N de Sierra de Guadalupe, 2300 m, 2 Nov 1963, *Matuda 37329* (LL - 2 sheets). HIDALGO: Cerros al N de Pachuca, 2450 m, 18 Sep 1966, *Rzedowski 23177* (TEX).

2. *ANISACANTHUS QUADRIFIDUS* var. *potosinus* Henrickson var. nov.

A. *quadrifida* var. *quadrifida* foliis linearis-lanceolatis (non lanceolatis), (0.9-)1 - 3(-5) [non (3-)4.5 - 9(-11)] mm latis, petiolis 0.5 - 1.2 [non (1-) 2 - 4] mm longis differt; a A. *linearea* et A. *juncea* corollis 29 - 36(-43) (non 40 - 56) mm longis, filamentis brevioribus id est 7 - 11 (non 18 - 35) mm longis differt.

Plants strongly branched, twiggy, erect to widely spreading, 0.5 - 1.5 m tall, often wider than tall; stems, inflorescence glabrous or with decurrent lines of decurved hairs 0.03 - 0.1 mm long, sometimes more striate; petioles 0.5 - 1.2 mm long; leaves linear-lanceolate to linear, (1.5-) 2 - 4(-5) cm long, (0.9-) 1.5 - 3(-5) mm wide, attenuate, at margins often more or less revolute with sparse decurved hairs, otherwise glabrous; leaf-blade typically conduplicate along midrib; calyces at anthesis 3.5 - 5(-5.5) mm long; lobes 2 - 3(-4) mm long, tube 1.3 - 2 mm long, lobes (1.1-)1.5 - 2 (-3) times as long as tube, weakly to strongly hirtellous and with stipitate glands 0.06 - 0.12 mm long, their glands 0.05 - 0.07 mm wide, mostly glandular and strigose inside lobes, marginal hairs 0.2 - 0.3 mm long; corollas 29 - 36 (-38) mm long; anthers 2.8 - 3.2 mm long. San Luis Potosi to northern Zacatecas. 1800 - 2100 m. (Figs. 2c-d, 3, 4).

TYPE: MEXICO. SAN LUIS POTOSI: Mpio. Villa de Reyes 3.9 km. al O. de la Carretera San Luis Potosi-Queretaro, por Carretera que va a Villa de Reyes. Km 20 de carretera S.L.P.-Queretaro, 1950 m, 8 Oct 1979, *J. Garcia, T. Wendt and E. J. Lott 1297* (HOLOTYPE: MEXU; ISOTYPES: TEX, CHAP and to be distributed).

Specimens examined: MEXICO. SAN LUIS POTOSI: Chiefly in region of San Luis Potosi, 6000 - 8000 ft, 1878, *Parry and Palmer 706* (F); San Luis Potosi, 1879, *Schaffner 367* (F); gravel washes, Bocas, 17 Aug 1891, *Pringle 3820* (F); Zaragoza, 2050 m, 7 Jul 1954, *Rzedowski 3516* (F); 13 mi NE of San Luis Potosi, 20 Aug 1954, *Waterfall 15679* (F); same location as type, 8 Oct 1979, *Garcia P. et al. 1297* (TEX, CHAP); 11 Oct 1979, *Wendt et al. 2235* (TEX, CHAP); on road between Real de Catorce and Doc de Catorce, ca 2100 m, near 23° 43'N lat, 100° 52'W long, 18 Sep 1980, *Henrickson & Bekey 18615, 18616, 18617* (TEX). ZACATECAS: *sin loc.*, *Lloyd 10* (F); 0.4 mi S of Zacatecas-Coahuila border along Hwy 54, near 24° 43'N lat, 101° 13'W long, 6100 ft, 30 Aug 1971, *Henrickson 6222* (TEX).

3. *ANISACANTHUS QUADRIFIDUS* var. *wrightii* (Torr.) Henrickson comb.

nov. *Drejera wrightii* Torr. in U.S. and Mex. Bound. Surv. Bot. 123. 1859. *Anisacanthus wrightii* (Torr.) Gray, Syn. Fl. N. Am. 2(1):238. 1878. TYPE: UNITED STATES. NEW MEXICO: May - Oct, 1848. *C. Wright 435* (HOLOTYPE: NY; ISOTYPE: TEX!).

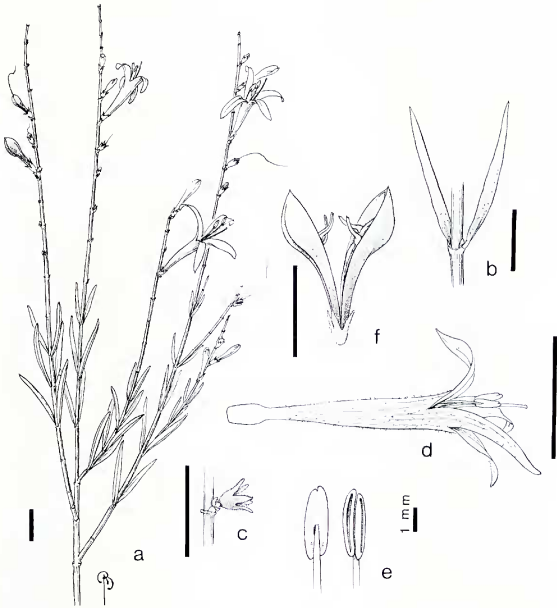


Fig. 4. *Anisacanthus quadrisfidus* var. *potosinus* Henrickson. a. — Stem showing linear leaves and flowers. This was drawn from a dried specimen and several flowers have fallen off distorting the second nature of the inflorescence. b. — Node with leaves showing line of abscission at base and distinctive stipular ridge connecting opposite leaf margins. c. — Calyx with associated bractlets. Calyx shown in dried condition with lobes flaring. d. — Corolla showing expanded base that surrounds ovary, strap-shaped lobes and position of anthers and style. e. — Anther, adaxial view (left) and abaxial view. f. — Open capsule showing retinacula. All from Garcia P. et al. 1297 (TEX). Scale bars = 1 cm except in e where bar = 1 mm. Drawing by B. Angell.

Plants moderately branched, erect to spreading; stems mostly with dense decurrent lines of decurved hairs 0.1-0.2-0.4(-0.6) mm long; inflorescences rather strongly hirtellous with erect hairs 0.03 mm long with or without decurrent longer hairs; petioles (3-)4-7(-11) mm long; leaf-blades lanceolate to broadly lanceolate (25-)30-50(-62) mm long, 7-15(-20)[-30] mm wide, margins mostly revolute when dried; calyces at anthesis (2.6-)3.5-4.5 (-5) mm long, lobes (1.3-)1.8-3.2(-4) mm long, tubes (1.2-)1.4-2(-2.0) mm long, lobes (0.9-)1.1-2.3 times as long as tubes, both hirtellous and with stipitate glands 0.03-0.08 mm long, their glands 0.03-0.06 mm wide, marginal hairs 0.1-0.2 mm long; corollas 31-40 mm long; anthers 2.5-3.2 mm long. Texas, Coahuila, Nuevo Leon and Tamaulipas. 300-900 m. (Figs. 2e-f, 3).

Representative specimens: UNITED STATES. TEXAS. Uvalde Co.: Con Can, along Rio Frio, 22 Jun 1963, *Correll and Wasshausen* 28016 (LL). MEXICO. NUEVO LEON: Lampazos, 21 Jun 1937, *Edwards* 282 (F, TEX); 12 mi W of Linares, 1200 ft, 26 Jul 1956, *Fearing and Thompson* 25 (TEX); behind Cola de Caballo, Monterrey, 29 May 1960, *Smith* M229 (F, TEX); Alamar to Puerto Blanco, 15 mi SW of Galeana, 23 Jul 1934, *Muller and Muller* 1197 (TEX); Rayones, 900 m, 9 Jun 1980, *Hinton* 17824 (TEX). COAHUILA: Muzquiz, Sabinas, 7 Nov 1936, *Marsh* 408 (TEX); Rancho Babia, 18 May 1938, *Marsh* 1209 (F, TEX). TAMAULIPAS: vicinity of San Jose, La Vegonia, 20 Jul 1930, *Bartlett* 10526 (F, TEX); vicinity of Victoria, 320 m, 1 Feb-9 Apr 1930, *Palmer* 120 (F).

4. *ANISACANTHUS QUADRIFIDUS* var. *brevilobus* (Hagen) Henrickson  
comb. nov. *Anisacanthus wrightii* var. *brevilobus* Hagen, Ann. Missouri Bot. Gard.  
28:400. 1941. TYPE: MEXICO. COAHUILA: Chojo Grande, 27 mi SE of Saltillo, 16  
Jul 1905, *Palmer* 719 (HOLOTYPE: NY!; ISOTYPES: CB, F!, MO).

Plants moderately branched, spreading to erect; stems more or less striate, mostly with decurrent lines of decurved hairs 0.1-0.3 mm long; inflorescences more or less decurrently, sulcately grooved, with short decurved hairs in sulci, otherwise glabrous; petioles (1-)1.5-2.1 mm long; leaf-blades narrowly lanceolate to linear-lanceolate, (17-)20-35(50-) mm long, 2.3-4.5(-5.5) mm wide, margins more or less revolute; calyces at anthesis 2.5-3.6 (-4.0) mm long, lobes 1-1.7 mm long, tubes (1.3-)1.5-2 mm long, lobes 0.5-0.8(-1.2) times as long as tubes, hirtellous and with mostly many stipitate glands 0.03-0.06 mm long, their heads 0.04-0.05 mm wide, strongly glandular and strigose inside, marginal hairs few, limited to a terminal tuft of hairs 0.1-0.2 mm long; corollas 33-37 mm long; anthers 2.2-2.9 mm long. Coahuila, in canyons southeast of Saltillo, 1700-2000 m. (Figs. 2g-h, 3).

Representative specimens: MEXICO. COAHUILA: Paso del Aguila, E of Saltillo, 12 Jul 1946, *Barkley et al.* 16M496 (TEX); same location, 2 Jul 1947, *Barkley et al.* 7244 (TEX-2 sheets); 12 air mi E of Saltillo, lower Canon de Chorro, 1900 m, 27 Sep 1980,

*Henrickson and Bekey* 18643, 18644 (TEX); 18 mi NE of Saltillo, 6 Aug 1957, *Waterfall and Wallis* 13246 (F-2 sheets).

Collections from near Galeana, Nuevo Leon have relatively broad leaves as in *A. q.* var. *wrightii* and short sepals as in *A. q.* var. *brevilobus* and are considered intermediate between the two taxa. While these characters tend to be uniform through this area, some specimens from the area have longer sepals (see *Muller and Muller* 1197).

Specimens examined: MEXICO. NUEVO LEON: Taray to Alamar, about 15 mi SW of Galeana, 20 Jul 1934, *Muller and Muller* 1108 (F, TEX); Hacienda Pabillo, Galeana, 27 Aug 1936, *Taylor* 262 (F, TEX); Mcpo. Galeana, 5400 ft, 2 Aug 1939, *Chase* 7731 (F-2 sheets); 1 mi W of Galeana on road to Cerro Potosi, 5400 m, 16 Sep 1980, *Henrickson and Bekey* 18540 (TEX).

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